

PATENT COOPERATION TREATY


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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference PO348PCT/MCG		FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/E2004/000152		International filing date (day/month/year) 08.11.2004	Priority date (day/month/year) 14.11.2003	
International Patent Classification (IPC) or national classification and IPC G01N1/28, C12M3/08, B02C19/08				
Applicant ENFER TECHNOLOGY LIMITED et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 7 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 24.08.2005		Date of completion of this report 15.12.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Hocquet, A Telephone No. +31 70 340-2928		

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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IE2004/000152

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-20 as originally filed

Claims, Numbers

1-64 filed with telefax on 11.10.2005

Drawings, Sheets

1/5-5/5 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application,

☒ claims Nos. 63-64

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international preliminary examination (specify):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☒ no international search report has been established for the said claims Nos. 63-64

☐ the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:

the written form ☐ has not been furnished

☐ does not comply with the standard

the computer readable form ☐ has not been furnished

☐ does not comply with the standard

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☒ See separate sheet for further details

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IE2004/000152

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-62
	No: Claims	
Inventive step (IS)	Yes: Claims	1-62
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-62
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item III

Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

No opinion can be established for claims 63 and 64, which haven't been searched because they are defined uniquely by reference to the figures, contrary to the requirements of Rule 6.2(a) PCT.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1: US-A-4 505 433 (SELENKE WILLIAM M) 19 March 1985 (1985-03-19)

D2: WO 00/02031 A (SAMAAN NASHED) 13 January 2000 (2000-01-13)

- 1.1 D1 discloses in its figure 4 a grinder with hollow shaft 64-65, a grinding head 63 and a port 70 situated at the bottom part of the shaft. The grinder of figure 4 cooperates with a container 11 seen in figure 1 or 2. The port 70 is used to deliver a liquid from the interior of the shaft to the interior of the container. There is no restriction on the dimensions of the port 70.
- 1.2 D2 discloses (page 19, lines 26 to page 20, line 10 and figure 1) an agitator able to disrupt particulate matter with an hollow shaft 50 comprising a port 51 at its bottom end and ports 52 along its elongated sides so as to withdraw sediments as well as different fluid layers.
- 2.1 The subject-matter of claims 1 and 57 is new in the sense of Article 33(2) PCT:
The homogeniser of claims 1 and 57 differs from the grinder of D1 in that:
 - the bottom part of the shaft is closed and the port is arranged on the elongate sides of the shaft (amendment based on figure 2 or 6-9 and page 14 of the application).
 - the ports are dimensioned so that only comminuted material may flow into the interior channel of the shaft.
- 2.2 The subject-matter of the same claims differ from the device of D2 in that:
 - the bottom part of the shaft is closed.
 - the ports are dimensioned so that only comminuted material may flow into the

interior channel of the shaft (whereas D2 want to withdraw also sediments from the bottom).

- The shaft bears a grinding head instead of an agitator.

- 3.1 The subject-matter of claim 60 is new in the sense of Article 33(2) PCT:
- it uses the homogenisers of claims 1-57 which are themselves new.
 - the method of homogenising disclosed in D1 differs from the method disclosed in claim 60 in that the homogenised material is removed from the interior of the container into the interior space of the shaft by means of the port, while in D1 the port 70 is used to deliver a liquid from the interior of the shaft to the interior of the container.
- 4.1 The problem to be solved by the present invention may be regarded as accessing the homogenate without disassembling the homogeniser (see application page 1, lines 24-30).
- 4.2 The solution to this problem proposed in claim 60 of the present application is considered as involving an inventive step (Article 33(3) PCT) over D1 because D1 does not suggest to transfer comminuted material in the interior of the shaft of a grinder to avoid disassembling the grinding head from the container.
- 4.3 The modifications of the grinding shaft mentioned in above paragraph 1.2 are special adaptations aiming at facilitating the removal of the comminuted material: a port located at the apex of the grinding head could become blocked with portions of tissues or debris, or if it is too large, let debris enter the shaft: this is the case in D2 where the sediments are sampled (page 19, line 31). The location on the elongated sides of the shaft combined with a closed bottom end provides technical advantages in solving the problem mentioned above in paragraph 4.1. None of the available documents suggest these modifications. The subject-matter of claims 1 and 57 is therefore also considered to involve an inventive step (Article 33(3) PCT).
- 5 The above reasoning applies to remaining claims 2-56, 58-59 and 61-62 because these claims contain all features of one of the independent claim 1, 57 or 60.

CLAIMS

1. An homogeniser for comminuting a sample of material comprising a container (1), and a grinder (20), wherein
- 5 the container (1) comprises an interior (2) defined by sidewalls (3), an upper portion (4) having an upwardly open top communicable with an exterior of the container, and an interior bottom (5), and the grinder (20) comprises
- 10 (i) a hollow shaft (22) locatable within the container, the hollow shaft (22) defining an interior channel (23),
- (ii) a grinding head (21) defining a closed end of the shaft (22),
- (iii) at least one port (24) located on the elongate sides of the shaft (22) said port being dimensioned so that only comminuted material may flow into the interior channel (23), of the shaft (22).
- 15 2. An homogeniser as claimed in claim 1 wherein the grinding head (21) comprises at least one blade.
3. An homogeniser as claimed in any preceding claim wherein the grinding head (21) is shaped to compliment the shape of the interior bottom (5), preferably wherein the shape is selected from the group consisting of substantially flat, substantially conical, substantially frustroconical, substantially hemispherical and substantially spherical-cap shaped.
- 20 4. An homogeniser as claimed in any preceding claim wherein the interior bottom (5) and the grinding head (21) each comprise a sample-engaging surface.
- 25 5. An homogeniser as claimed in claim 4 wherein at least one of the sample-engaging surfaces is substantially smooth.
- 30 6. An homogeniser as claimed in any of claims 4-5 wherein at least one of the sample-engaging surfaces is an abrasive surface, preferably wherein the abrasive surface comprises at least one abrasive feature selected from the group consisting of protrusions, griddles, indentations, hatching or embedded particles.
- 35 7. An homogeniser as claimed in claim 6 wherein the at least one abrasive surface is integrally formed with at least one of the grinding head (21) or the interior bottom (5).
8. An homogeniser as claimed in claim 6 wherein the at least one abrasive surface is independently formed with at least one of the grinding head (21) or the interior bottom (5).
- 40

9. An homogeniser as claimed in any preceding claim wherein the port (24) is dimensioned so that only comminuted material may pass into the interior space (23) of the shaft (22) from the container (1).
10. An homogeniser as claimed in any preceding claim wherein the port (24) comprises a slit formed in the shaft (22).
11. An homogeniser as claimed in any preceding claim wherein the port (24) is positioned on the shaft (22) proximate to the grinding head (21).
12. An homogeniser as claimed in any preceding claim wherein there is provided a plurality of ports (24) on the shaft (22).
13. An homogeniser as claimed in any preceding claim wherein there is provided a means to reversibly close the at least one port (24).
14. An homogeniser as claimed in any preceding claim wherein the at least one port (24) is positioned on the shaft (22) such that when the apparatus is used in combination with a defined volume of a solution separable into at least two layers defined by differing density gradients, the positioning of the at least one port permits egress of at least one of the layers into the interior space (23) and permits the prevention of egress of at least one of the layers into the interior space (23).
15. An homogeniser as claimed in any preceding claim wherein the upper portion of the shaft (26) is provided with an engagement means (201), the engagement means (201) providing a means of detachably engaging the shaft (22) with a rotation device (203), or a rotation device adaptor, or a closure means (204).
16. An homogeniser as claimed in claim 15 wherein the engagement means (201) comprises at least one groove, projection or indentation on the upper portion of the shaft (26).
17. An homogeniser as claimed in any of claims 15-16 wherein the engagement means (201) is shaped to complement the shape of the rotation device (203), the rotation device adaptor, or the closure means (204).
18. An homogeniser as claimed in any of claims 15-17 wherein the engagement means (201) comprises a pair of 180° helices in which the end of each helix most distal to the grinding head (21) is separated from the end of the other helix by half of the perimeter (29) of the shaft (22).
19. An homogeniser as claimed in any of claims 15-18 wherein engagement of the engagement means (201) with the rotation device (203), or the rotation device adaptor, or the closure means (204)

permits movement of the rotation device (203), or the rotation device adaptor, or the closure means (204) in at least one direction to be translated into movement of the shaft (22) in the same at least one direction.

20. An homogeniser as claimed in claim 19 wherein the direction is rotational about the central axis (A) of the shaft (22).

21. An homogeniser as claimed in any of claims 15 to 20 wherein the engagement means (201) is further provided with a coupling means (202) to provide reversible and secure coupling of the shaft (22) to the rotation device (203) or to the rotation device adaptor or to the closure means (204).

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22. An homogeniser as claimed in claim 21 wherein the coupling means (202) comprises a groove, projection or indentation adapted to engage with the rotation device (203) or with the rotation device adaptor or with the closure means (204) such that movement of the rotation device (203), or the rotation device adaptor, or the closure means (204) in one of at least two directions is translated into movement of the shaft (22) in the same direction.

15

23. An homogeniser as claimed in claim 22 wherein the first of the at least two directions is rotation about the shaft axis (22) and the second of the at least two directions is substantially parallel to the shaft axis (22).

20

24. An homogeniser as claimed in any of claims 15 to 23 wherein the closure means (204) is adapted to be securely and reversibly engagable with the engagement means (201) and provide a substantially watertight seal therein.

25. An homogeniser as claimed in any of claims 15-24 wherein the closure means (204) further comprises a rotation device (203) or a rotation device adaptor.

25

26. An homogeniser as claimed in any preceding claim wherein the shaft (22) further comprises a biasing means for biasing the grinding head (21) against the interior bottom (5) of the container (1).

30

27. An homogeniser as claimed in any preceding claim wherein the grinder (20) can nest within the container (1), such that the grinding head (21) is proximate to the interior bottom (5), and a sample of comminutable material can be contained between the grinding head (21) and the interior bottom (5), and movement of the grinder (20) relative to the container results in the sample of material being comminuted.

35

28. An homogeniser as claimed in claim 27 wherein the grinder (20) is moveable in at least one direction chosen from rotational movement and movement in a direction substantially parallel to the central axis (A).

40

29. An homogeniser as claimed in any preceding claim further comprising a cap (10), wherein the cap (10) comprises a roof portion (15) and an outer skirt (14) engagable with the upper portion of the container (4) and the roof portion (15) further comprises an aperture (11) adapted to permit the shaft (22) of the grinder (20) to protrude through the aperture (11).

5

30. An homogeniser as claimed in claim 29 further comprising a shaft engaging means and a portion of the shaft (22) is dimensioned to be engagable with the shaft engaging means.

10

31. An homogeniser as claimed in claim 30 further wherein the shaft engaging means extends from the periphery of the aperture (11).

32. An homogeniser as claimed in any of claims 30-31 wherein the shaft engaging means comprises an internal continuous sidewall (12).

15

33. An homogeniser as claimed in any of claims 29-32 wherein the cap (10) is provided with a securing means to reversibly secure the cap to the upper portion of the container, preferably wherein the securing means is selected from at least one of the group consisting of a push-fit mechanism, a snap-lock mechanism, thread and screw arrangement,

20

34. An homogeniser as claimed in any of claims 29 to 33 wherein the shaft (22) is provided with a restraining means to limit the movement of the shaft (22) through the aperture (11).

35. An homogeniser as claimed in claim 34 wherein the restraining means comprises a collar (27) located on the shaft (22).

25

36. An homogeniser as claimed in claim 34 wherein the restraining means comprises a shoulder located on the shaft, wherein the shoulder is defined by a step-wise alteration in the radius of the shaft (22).

30

37. An homogeniser as claimed in any preceding claim wherein at least one of the group consisting of the homogeniser, container (1), grinder (20) or cap (10) is substantially translucent.

35

38. An homogeniser as claimed in any preceding claim wherein the homogeniser is substantially composed of thermoplastics or metals and is preferably machined from solid or plastic casting or metal casting or injection moulded.

39. An homogeniser as claimed in any of claims 1 to 37 wherein the homogeniser is substantially composed of glass or ceramic.

40. An homogeniser as claimed in any preceding claim wherein at least one portion of the homogeniser is composed of, impregnated with, or coated with a reactive material selected to react with a moiety intended for use within the homogeniser.
- 5 41. An homogeniser as claimed in claim 40 wherein the reactive material is adapted to adhere to biological molecules that may be found in an homogenised sample.
42. An homogeniser as claimed in any of claims 40-41 wherein the reactive material is chosen from the group consisting of at least one antibody species, at least one enzyme species, at least one biological
10 marker species.
43. An homogeniser as claimed in any of claims 1-42 further comprising a means to aspirate the homogenate from the inner channel (23).
- 15 44. An homogeniser as claimed in any of claims 1-43 further comprising a means to dispense material into the homogeniser.
45. An homogeniser as claimed in any preceding claim further comprising a holding device.
- 20 46. An homogeniser as claimed in claim 45 wherein the container further comprises a positioning means engagable with the holding device, such that the positioning means permits the container (1) to be engaged in a specific orientation relative to the holding device.
47. An homogeniser as claimed in claim 46 wherein the positioning means is located distal to the
25 upper portion (4).
48. An homogeniser as claimed in claim 47 wherein the specific orientation permits a defined area (100) of the container (1) to be presented to an identification reader.
- 30 49. An homogeniser as claimed in claim 48 wherein the identification reader is located on the holding device.
50. An homogeniser as claimed in any of claims 48-49 wherein the identification reader is a barcode scanner or reader of a global unique identifier.
- 35 51. An homogeniser as claimed in any preceding claim further comprising a rotation device.
52. An homogeniser as claimed in claim 55 wherein the rotation device further comprises a biasing means to provide a substantially constant force to the grinder (22) when the rotation device is engaged
40 with the engagement means, preferably in the form of a spring.

53. An homogeniser as claimed any of claims 51-52 wherein the rotation device is either mechanically or manually operable.
- 5 54. An homogeniser as claimed in any of claims 51-53 wherein the rotation device further comprises a means to aspirate the comminuted material from the interior space (23).
55. An homogeniser as claimed in any of claims 51-54 wherein the rotation device further comprises a means to dispense material into the homogeniser.
- 10 56. An homogeniser as claimed in any of claims 45-55 wherein the holding device and rotation device are integrally formed.
57. An homogeniser for homogenising a sample of material comprising a grinder (20), wherein the
15 grinder (20) comprises
- (i) a hollow shaft (22) having an interior channel (23),
 - (ii) a grinding head (21) defining a closed end of the shaft (22),
 - (iii) at least one port (24) located on the elongate side of the shaft (22) said port being dimensioned
20 so that only homogenised material may flow into the interior space (23) of the shaft (22).
58. A kit for homogenising a sample of material comprising a plurality of homogenisers substantially as described in any of claims 1 to 57.
- 25 59. A kit for homogenising a sample of material comprising at least one homogenisers substantially as described in any of claims 1 to 57 and further comprising at least one of the group consisting of a rotation device, a rotation device adapter, a closure means or a holding device.
60. A method for homogenising a sample of material comprising the use of an homogeniser as
30 claimed in any of claims 1 to 57, and
- (i) placing the sample to be homogenised within the interior (2) of the container (1) such that it can be retained by the interior bottom (5),
 - (ii) inserting the shaft (20) into the interior (2) such that the grinding head is contactable with the sample,
 - 35 (iii) placing the cap (10) on the container (1) such that the upper portion (26) of the shaft (22) extends through the aperture (11),
 - (iv) engaging the engagement means (201) with the rotation device and optionally securably restraining the rotational movement of the container (1) relative to the shaft (22) optionally by means of the holding device.

- (v) homogenising the sample material by means of movement of the shaft (22) relative to the container (1),
- (vi) removing homogenised material from the interior of the container (1) into the interior space (23) of the shaft (22) by means of at least one port (24).

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61. A method as claimed in claim 60 wherein the comminuted tissue in the interior space (23) of the shaft (22) is removed from the comminuter by aspiration.

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62. Use of an homogeniser, a kit for homogenising, or method of comminuting a sample substantially as described in any of claims 1-61.

63. An homogeniser for homogenising material substantially as described herein with reference to the accompanying figures.

15

64. A method for homogenising material substantially as described herein reference to the accompanying figures.

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